Climate Change Adaptation Research Grants Program
- Emergency Management Projects

Project title:
A spatial vulnerability analysis of urban populations to extreme heat events in Australian capital cities and predicted spatial vulnerability for 2030 climate change predictions.

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Objectives:
This study will; identify threshold weather conditions for mortality in Australian capital cities; describe spatial distributions of human vulnerability to extreme heat, and provide information to target emergency responses during heat waves. Baseline risk will be used to predict changes in vulnerability in relation to predicted changes in climate extremes associated with climate change.

Project design and methods
Description: A comprehensive review of the literature available relating to human heat vulnerability will be undertaken for each State and Territory, in addition to an overview of the international literature. A reference group will be established with representatives invited from EMA, DoHA and each capital city (DoHs) to provide advice on the index design, validation and interpretation. A national workshop (funded separately) will be held towards the end of the project. This would involve members of the Reference Group and emergency care managers from Ambulance Services, State Emergency Services, Police and Government institutions and health care providers. An index will be developed for each capital city that describes baseline (current) risk and predicted changes in risk in relation to climate change impacts for 2030.

Baseline: Threshold temperatures will be established for each capital city using the methodology described in Nicholls *et al.* 2008. A Simple Heat Alert System for Melbourne Australia. An index will be constructed to describe population vulnerability based on known health, environmental and demographic aspects of urban populations that increase the risk of heat related illness. (This has already been completed for Melbourne and is in use by the Victorian DoH to establish heatwave tool kits by local governments). The index as a 'tool' is easily modifiable and will be changed to incorporate variables that provide information to EM in each city (variables will be identified by the reference group). To determine how well the index predicts population at risk during heat events the index will be tested against known adverse health outcomes and emergency responses (emergency hospital admissions/ambulance callouts/state Em Service callouts) during heat events. Maps of the baseline risk in each capital city will be created using GIS software.

Climate change impacts: Using the baseline predictions for each city the changes in risk associated with climate change will be estimated using predicted changes in temperature extremes and associated conditions. We will use CSIRO Marine and Atmospheric Research projections downscaled (60 km resolution or better) from their CCAM simulations using the A2 emissions scenario. Data are available out to 2100, but the project will concentrate on simulations out to 2030 for which we also have good socioeconomic projections. There is considerable uncertainty associated with predictions of climate extremes for regions such as capital cities. There is also a degree of uncertainly around predicting changes in population risk factors over time. Acknowledging these limitations, changes in risk profiles for communities based on changes in aged (65+ years) population distributions, predicted changes in population density as a surrogate for changes in the intensity of the UHI in each city, and changes in risk associated with changes in economic wealth of areas, will be developed. Predicted changes in risk will be mapped at a spatial aggregate of statistical local areas (SLA) as determined by the spatial level of available data. Interim reports will be produced prior to each reference group meeting; a final report will be produced at the completion of the project.